

Calculating percent by mass/volume

Chem Worksheet 15-2

Name _____

The concentration of a solution can be expressed as a percent – the ratio of solute to solution. This calculation is commonly performed based on the mass of a substance (m/m) or on the volume of substances (v/v). A solution that is composed of 5 g of salt for every 95 g of water will have a mass percent of 5%.

$$\frac{5 \text{ g NaCl}}{(5 \text{ g} + 95 \text{ g}) \text{ solution}} \times 100 = 5 \%$$

USEFUL EQUATIONS

$$\text{Percent by Mass} \quad \frac{\text{mass solute}}{\text{mass solution}} \times 100$$

$$\text{Percent by Volume} \quad \frac{\text{mass solute}}{\text{mass solution}} \times 100$$

$$\text{Solution} = \text{solute} + \text{solvent}$$

$$1 \text{ kg} = 1000 \text{ g}$$

$$1 \text{ L} = 1000 \text{ mL}$$

A solution made from 35 mL of ethanol and 65 mL of water will have a percent by volume of 35%.

$$\frac{35 \text{ mL ethanol}}{(35 \text{ mL} + 65 \text{ mL}) \text{ solution}} \times 100 = 35 \%$$

Answer the following questions. Show all work and report answers with units.

1. What is the percent by mass of 5.0 g of iron (II) sulfate dissolved in 75.0 g of water?
2. A solution is made by adding 25 mL of benzene to 80 mL of toluene. What is the percent by volume of benzene?
3. A solution is formed by adding 35 g of ammonium nitrate to 250 g of water. What is the percent by mass of ammonium nitrate?
4. What is the percent by volume of a solution formed by mixing 25 mL of isopropanol with 45 mL of water?
5. What is the mass percent of each component in the mixture formed by adding 12 g of calcium sulfate, 18 g of sodium nitrate, and 25 g of potassium chloride to 500 g of water?
6. A solution is made by dissolving 125 g of sodium chloride in 1.5 kg of water. What is the percent by mass?
7. What is the percent by volume of a solution formed by added 15 L of acetone to 28 L of water?
8. An experiment requires a solution that is 80% methyl alcohol by volume. What volume of methyl alcohol should be added to 200 mL of water to make this solution?